Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-639-RC2, 2017
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Detection of O_4 absorption around 328 nm and 419 nm in measured atmospheric absorption spectra" *by* Johannes Lampel et al.

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Received and published: 11 October 2017

general comments:

This study applies regression analysis to data sets of atmospheric spectra to find evidence for the incompleteness of currently available oxygen associated absorption cross sections around 328nm and 419nm. Specifically, no spectrally resolved absorption cross sections are available for these bands. While the study does not claim to generate accurate new cross sections, it gives approximate values for the peak absorption strength and peak wavelength for the bands at 328nm and 419nm. The data sets and methods used seem to be well suited for the purpose of the study. Wavelength

ranges are motivated from earlier studies. Band shapes are transferred from neighboring bands in a zeroth order approximation. I do not see a significant potential to extract more information from the data sets for the purpose of the study by using additional or other methods than those presented in the study. The study is a helpful contribution moving the remote sensing technique forward, underlining that better knowledge about oxygen collision induced absorption cross sections is necessary to overcome current limitations. I recommend publication after a few minor adjustments, as described below.

specific comments:

Given the scope of the article, the publications by Dianov-Klokov 1959, 1963, 1964, and 1965 seem to be relevant and should be included in the publication to give the reader a more complete overview of the available literature. The findings in this publication about absorption strengths (of liquid oxygen) are in agreement with the findings presented here.

The assignment of absorption bands to transitions (e.g. in table 2) seems to be incorrect, following e.g. Salow and Steiner 1936, Dianov-Klokov 1959, or the mentioned Greenblatt et al 1990 reference. E.g., for the 328nm band, the initial state is ${}^3\Sigma_g^- \& {}^3\Sigma_g^-$, and the final state is ${}^1\Sigma_g^+ \& {}^1\Sigma_g^+, \nu = 3$. When updating the states throughout the paper, I would recommend to use the full state description for the sake of completeness.

Figure 3: The figure, respectively the analysis, would benefit from an additional fit where the offset is constrained to 0 (assuming the same light path at 328nm and 343nm).

The wording of the article is sometimes not ideal. While not essential for publication, it would benefit from being revised and fine tuned by a native English speaker. The comments below pertain to obvious glitches.

technical corrections/suggestions:

page 2, line 16: extra parentheses, remove

page 2, line 21: incorrectly formatted reference

page 3, line 6: rephrase "play a role" to "are responsible for the observed structures" for more clarity

page 3, line 12: "... a measurement campaign in Antarctica was undertaken based at the New Zealand station Scott Base." Rephrase for more clarity.

page 10, line 1: rephrase "As can be seen, ... is visible.", and the following sentence

page 15, line 29: correct "rather ... rather than"

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